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AUTHOR Omanson, Richard C.
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ABSTRACT

Four experiments involving 54 adults were performed to examine the relationship between the effects of story grammar categories and content centrality on subjects' importance ratings, summaries, immediate recall, and delayed recall. Results of the studies indicated that central content units were judged as more important and were better recalled over time than noncentral content units. Central content was also found to enhance the salience of identical statements contained in internal response and reaction categories and to account for a large portion of the overall story category effect in each experiment, suggesting that the effects of centrality on story content exist independently of the story category in which it is contained. However, reliable story category effects remained after centrality was partialed out in an analysis of covariance, suggesting that the effects of story categories also exist independently of the centrality of the content. These results suggest that both data-driven processing assumed by content centrality and schema-driven processing assumed by story grammars occur during story comprehension. (Author/MKM)

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Richard C. Omanson

Learning Research and Development Center

University of Pittsburgh

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Richard C. Omanson

Learning Research and Development Center

University of Pittsburgh

Much of the recent work in story comprehension has hypothesized that people use story schemata to guide the recall of narrative content. This work starts with the observation that many simple stories have a canonical structure. The existence of this canonical structure suggests that people have implicit knowledge about these canonical forms and use this knowledge to guide comprehnsion processes (cf., Johnson & Mandler, 1980). This knowledge is thought to exist as a schema, and its use to conform to other types of schema (cf., Stein & Trabasso, in press; Thorndyke & Yekovitch, 1980). Specifically, story schemata are thought to be used in a top-down fashion to determine how a text is chunked during encoding and to generate expectancies about the nature of upcoming content.

Some investigators (e.g., Mandler & Johnson, 1977; Rumelhart, 1975; Stein & Glenn, 1979; Thorndyke, 1977) have devised grammars that describe the categories and relations of story schemata in terms of rewrite rules. The primary purpose of these grammars is to describe story schemata, and as a result are also able to describe the constituent structure of simple stories.

Recently, Omanson (in press) has presented an analysis of narratives that has a different goal. The purpose of this analysis is to identify the gist or plot of a given story. Use of this analysis involves four steps:

1. The text is divided into units, roughly corresponding to clauses, that depict a single story event or state.

2. Each unit is classified as identifying (introducing a character), focal (depicting something that happens in the story), or characterizing (describing a character, setting, or a previously depicted event).

3. The componential, causal, purposeful, disruptive, and enabling relations connecting focal events and states are identified. Componential relations group events and states into composite events and states. The remaining relations identify how these events and states are purposefully and causally connected to each other.

4. Each unit is classified as Central, Supportive, or Distracting, on the basis of its classification and relations. Central content is the causal-purposeful sequence that carries the reader through the story. Supportive content elaborates on this sequence, while Distracting content interrupts it.

In contrast to story grammars, this analysis assumes that higher-order comprehension processes are essentially data-driven and utilize knowledge of social actions rather than knowledge of story structure. It assumes that people adopt what Coleridge (1817/1967) called the "willing suspension of disbelief" and attempt to discover how the text explains the actions of the main characters.

It is important to note that this analysis does <u>not</u> assume that readers classify content as Central or Non-Central as they read. It assumes only that readers connect new content with old content with relations in order to explain the actions of the characters. Actions

that are "explained" in this manner form a causal-purposeful sequence of events and states. Classifying these events and states as Central reflects the hypothesis that content so connected will be judged as more important and will be better recalled than Non-Central events and states. This hypothesis follows from the assumption that stories are read to discover how the text explains the actions of the main characters, because Central content consists of the minimal set of events and states from which the reader can figure out what happened in the story and why it happened. Data from a number of studies support this hypothesis (cf., Omanson, in press).

The purpose of the present paper is three-fold. First it seeks to replicate the findings of Omanson (in press) that Central content is judged as more important and better recalled than Non-Central content.

A second purpose is to test an additional hypothesis that people form a better established representation of Central content than of Non-Central content. The previously described hypothesis holds that Central content is more accessible during recall. This effect may reflect that readers form a representation of Central content that is superior to their representation of Non-Central content along several dimensions. One such dimension may be resistence to decay over time. This hypothesis holds that the connections between Central content units readers form which make these units more accessible during recall, also make them more resistent to decay. The experiments reported below will provide an initial test of this hypothesis.

A third purpose of the present paper is to present evidence that people use both schema-driven processing like that assumed by story grammars and data-driven processing like that assumed by the present analysis. The point of contact between story grammars and the present analysis on this hypothesis is the saliency of story categories. Story categories have a highly reliable pattern of saliency in recall and importance judgment tasks that have been considered as one indication that a story schema is being used during comprehension (e.g., Glenn, 1978; Mandler, 1978; Mandler & DeForest, 1980; Mandler & Johnson, 1977; Mandler, Scribner, Cole, & DeForest, 1980; Stein & Glenn, 1979; Stein, Note 1; Stein & Glenn, Note 2). In recall for example, Settings, Initiating Events, and Consequences are most salient, followed by Attempts, followed by Internal Responses and Reactions. The present analysis, on the other hand, argues that salience in recall is a function of Centrality. By examining the effects of Centrality on the judged importance and recall of story categories, one can assess if story category effects simply reflect the amount of Central content they contain or if they exist over and above Centality effects.

The effects of Centrality on story category saliency will be assessed in the experiments below in two ways. The first involves a manipulation in which the Centrality of identical Internal Response and Reaction statements is varied across different versions of the same story. The second involves an analysis of covariance performed on individual content units with story category entered as a between unit factor and Centrality entered as a covariate. If data-driven

processing like that assumed by the present analysis occurs during comprehension, Centrality should enhance the judged importance and recall of the individual Internal Response and Reaction statements. Additionally, when Centrality is entered as a covariate, it should account for a large portion of the story category effect. However, if schema-driven processing like that assumed by story grammars also occurs, one would expect story category effects to remain even after the effects of Centrality have been partialed out.

Method

Four experiments were conducted to address the above questions. The first two experiments examined the judged importance of content units contained in each story. In Experiment 1, this was done by having subjects rate the importance of each unit on a seven-point scale. In Experiment 2, this was done by having subjects write a summary of each story while consulting the text. The last two experiments examined the recall of each story. In Experiment 3, recalls were obtained immediately after the subjects finished reading the stories. In Experiment 4, recalls were obtained after a delay of one week. Since the design and procedure of these four experiments are identical, their method will be described concurrently.

Subjects

Each experiment used 54 adult subjects. Half of the subjects in each experiment were male and half female. Approximately 1/8 of the subjects in Experiments 2 and 3 were solicited through a campus newspaper. These subjects were paid $2.00 and were distributed evenly across experimental conditions. The remaining subjects in all four

experiments were undergraduates at the University of Minnesota who participated as part of their introductory psychology course.

Materials

Three versions of three stories, called Airplane, Bee, and Turtle, were constructed so that each consisted of three episodes as defined by Stein and Glenn's (1979) story grammar. Each version of the Airplane and Bee stories contained 23 content units while each version of the Turtle story contained 20 content units. The middle episode of each version of a given story contained three identical Internal Responses (an emotion, cognition, and goal) and three identical Reactions (an emotion, cognition, and action). The text and story grammar analysis of each version of the Turtle story is presented in Table 1.

Across the three versions of each story, the surrounding material was changed so that a different Internal Response and Reaction was Central. For example in the Turtle story, Mark and Sally are sailing a toy sailboat that begins to sink when a turtle crawls on top of it. When Mark sees the turtle, three Internal Responses occur:

1. His long standing desire to have Sally see a turtle is brought to mind (goal).
2. He thinks the turtle is hurt (cognition).
3. He is put in a happy mood (emotion).

In Version 1 of this story, only the goal of showing Sally the turtle prompts subsequent events, which makes it Central. In Version 2, only the cognition of thinking the turtle was hurt prompts subsequent events, which makes it Central, while in Version 3, only the emotion

Table 1

Story Categories and Central Classification of Each Version of the Turtle Story

Unit Number	Story Category	Version 1	Version 2	Version 3
1	Setting	*One day Mark and Sally were** *sailing their toy sailboat in the pond.*	*One day Mark and Sally were sailing their toy sailboat in the pond.*	*One day Mark and Sally were sailing their toy sailboat in the pond.*
2	Initiating Event	*Suddenly the sailboat began to sink.*	*Suddenly the sailboat began to sink.*	*Suddenly the sailboat began to sink.*
3	Internal Response	Mark was surprised.	Mark was surprised.	Mark was surprised.
4	Attempt	*He lifted the boat up with a stick*	*He waded out to the boat*	*He pushed the boat onto shore with a stick*
5	Consequence	*and found a turtle on top of it.*	*and found a turtle on top of it.*	*and found a turtle on top of it.*
6	Reaction	The turtle became frightened	the turtle became frightened	the turtle became frightened
7	Initiating Event	and tried to crawl off the boat.	*and tried to crawl off the boat.*	*and tried to crawl off the boat.*
8	Internal Response	The turtle put Mark in a playful mood.	The turtle put Mark in a playful mood.	Mark thought the turtle was hurt.
9	Internal Response	Mark thought the turtle was hurt.	Mark had always wanted Sally to see a turtle.	Mark had always wanted Sally to see a turtle.
10	Internal Response	*Mark had always wanted Sally to see a turtle.*	*Mark thought the turtle was hurt.*	*The turtle put Mark in a playful mood.*
11	Attempt	*so he waded out to the turtle*	*He gently tried to lift the turtle off the boat.*	*He tried to tie the boat to the turtle's back.*
12	Consequence	*and brought it back to her.*	*but found that its foot had poked through the sail.*	*but the turtle bit him on the hand.*
13	Reaction	Sally thought Mark was going to hurt the turtle.	Sally felt sorry for Mark.	Sally thought Mark was going to hurt the turtle.
14	Reaction	Sally felt sorry for Mark.	Sally tried to touch the turtle.	Sally tried to touch the turtle.
15	Reaction	*Sally tried to touch the turtle.*	*Sally thought Mark was going to hurt the turtle.*	*Sally felt sorry for Mark.*
16	Initiating Event	*but the turtle bit her.*	*So when Mark got out his pocketknife,*	When Mark saw how Sally felt.
17	Internal Response	Sally didn't like this	Sally got upset.	*it made him very proud.*
18	Attempt	*and threw the turtle into the pond.*	*She tried to grab the turtle away from Mark*	*Mark tried to show Sally his wound*
19	Consequence	*The turtle crashed into the sailboat.*	*and accidently broke the boat's mast off.*	*and accidently stepped on the sailboat.*
20	Reaction	*Sally knew she had made a mistake.*	*Sally knew she had made a mistake.*	*Mark wished he hadn't tried to act so big.*

* Italic content units are classified as central.

of being in a happy mood prompts subsequent events, which makes it Central.

Similarly Mark's actions in each of these versions produces the three identical Reactions in Sally:

1. She tries to touch the turtle (action).
2. She thinks Mark is going to hurt the turtle (cognition).
3. She feels sorry for Mark (emotion).

In Version 1 of this story, only the action of touching the turtle prompts subsequent events, which makes it Central. In Version 2, only the cognition that Mark is going to hurt the turtle prompts subsequent events, which makes it Central, while in Version 3, only the emotion of feeling sorry for Mark prompts subsequent events, which makes it Central.

Across the three stories within each version, each type of Internal Response was paired with each type of Reaction as being Central. The classification of each unit of each version of the Turtle story as Central or Non-Central is also presented in Table 1.

Procedure

Subjects were run in groups varying in size from one to six. Each subject was given a packet containing instructions, the three stories of the version appropriate to their experimental condition, and response sheets.

The first page of this packet indicated that the subjects were to read the stories and that they would subsequently be asked to rate the importance of each content unit (Experiment 1), write a summary of

each story (Experiment 2), write the stories down from memory (Experiment 3), or write the stories down from memory a week later (Experiment 4).

The second page of the packet contained instructions for rating the stories. Subjects were instructed to:

1. Read the stories carefully.
2. Take as much time as they wanted.
3. Not to reread any portion of the story.
4. Not to rehearse or try to memorize portions as they read
5. To pretend they have just picked up a book of short stories and are reading for fun.

The next three pages of the packet contained the three stories of the appropriate version. Within each version of each experiment the three stories appeared in each of six possible orders three times. The respective mean reading times for reading each story in Experiments 1, 2, 3, and 4, was 53, 55, 62, and 63 seconds.

The remaining pager of each packet contained response sheets. In Experiment 1, these sheets consisted of the three stories divided into content units. Subjects in this experiment were instructed to rate the importance of each content unit on a scale from 1 to 7, with 7 indicating that the unit was absolutely essential to the story and 1 indicating it was totally unessential to the story.

For Experiments 2, 3, and 4, the response sheets were blank. In Experiment 2, subjects were instructed to write a summary of each story while refering back to the original text. In Experiments 3 and 4, subjects were instructed to write down everthing they could

remember about the stories. While subjects were encouraged to write down the stories exactly as they read them, and not to add anything not actually in the story, they were also instructed not to leave anything out because they couldn't remember exactly how it was phrased.

Scoring

The dependent measure used in Experiment 1 was the rating given to each content unit. The summaries and recalls of Experiments 2, 3, and 4 was scored as to whether the gist of each content unit was present or absent. Two raters scored the stories of one subject taken from each sex X version cell within each experiment. On the basis of these 54 stories, interrater reliabilities were .98, .96, and .96 for Experiments 2, 3, and 4 respectively. Disagreements were resolved by mutual consent.

The content units in each story were classified in two ways forming two sets of independent variables. First, they were classified according to the story categories of Stein and Glenn's (1979) grammar. Two raters agreed on 98% of these classifications. Disagreements were resolved by mutual consent.

Second, the content units were classified as Central or Non-Central according to the present analysis. A graduate student in education was taught the analysis and analyzed one version of each story. An overall interrater reliability coefficent of .90 was obtained with the analysis performed by the author. This coefficient reflects the cumulative effect of disagreements in identifying unit boundaries, unit classifications, relations, and Centrality. The

breakdown of this reliabiliy is as follows:

1. There was perfect agreement in identifying the content unit boundries.

2. Given agreement on unit boundries, there was perfect agreement on classifying the units as identifying, characterizing, or focal.

3. Given agreement on classifying the units as identifying, characterizing, or focal, there was 92% agreement on identifying the specific relations.

4. Given agreement on relations, there was perfect agreement on classifying the units Central or Non-Central (i.e., Supportive or Distracting).

Results

The results of these experiments will be described in three parts. First we will consider evidence that Central content is judged as more important and is more likely to recalled than Non-Central content. These results are presented in Table 2. As can be seen from this table, Central units are judged as more important, and are better recalled than Non-Central units. An analysis of variance with story version and sex entered as between subject factors, and Centrality and story topic (i.e., Airplane, Bee, and Turtle) entered as within subject factors, indicate that these differences are reliable, $p < .01$. The respective F (1,48) ratios of this main effect in the four experiments are 408.32, 353.81, 467.65, and 244.76. The magnitude of this Centrality effect is large, accounting for 54%, 72%, 50%, and 41% of the total variance (ω^2) in Experiments 1, 2, 3, and 4 respectively. These analyses also indicate that Centrality interactes with sex, story version, and story topic. These interactions, however, simply reflect that the effect of Centrality is greater in

Table 2
Judgement and Recall Scores for Central and Non-Central Units:
Mean Subject Scores

Type of Score	Central[a]	Non-Central	Variance[b] Accounted for (ω^2) by Centrality
Judgment			
Rating (Experiment 1)[b]	5.6	3.8	.54
Summary (Experiment 2)[c]	.75	.29	.72
Recall			
Immediate (Experiment 3)[d]	.67	.32	.50
Delayed (Experiment 4)[d]	.42	.12	.41

[a] All differences between Central and Non-Central are reliable, $p < .01$. N = 54 for each score
[b] Mean importance rating. 7 = Absolutely essential to story, 1 = totally unessential to story
[c] Proportion of content units appearing in summaries
[d] Proportion of content units appearing in recalls

some conditions than others. Dunn tests indicate that the judged importance and recall is reliably greater ($p < .01$) within each level of each interacting factor of each experiment. This Centrality effect was also reliable in each experiment, $p < .01$, when a comparable analysis was performed on the scores of individual content units summed across subjects. The respective F (1,192) ratios of the Centrality main effect on these scores in the four experiments are 194.08, 254.49, 119.42, and 120.24.

The second question addressed by there experiments is whether Central content is more resistent to decay over time on recall tasks than Non-Central content. The ratio of each unit's delayed recall score over its immediate score was computed as an index of decay. This comparison revealed that the proportional loss of recall after a week's delay was reliably smaller for Central (.33) than for Non-Central content (.62), t (193) = 4.55, $p < .01$.

The third question addressed by these experiments concerns the relationship between Centrality and story category effects. The first finding of interest to this question is that the category effects which have been reported by Stein and Glenn and by Mandler and Johnson were replicated. These results are presented in Table 3. As can be seen from this table, Settings, Initiating Events, and Consequences were judged as most important and were recalled best, followed by Attempts, followed by Internal Responses and Reactions. An analysis of variance with sex and story version entered as between subject factors, and story category and story topic entered as within subject factors indicated that the differences among story categories are

Table 3
Judgement and Recall Scores for Each Story Category:
Mean Subject Scores

Type of Score	Story Category					
	Setting	Initiating Event	Internal Response	Attempt	Consequence	Reaction
Judgment						
Rating[a] (Experiment 1)	5.7	5.7	4.0	5.0	5.7	4.5
Summary[b] (Experiment 2)	.80	.70	.42	.51	.71	.49
Recall						
Immediate[c] (Experiment 3)	.71	.64	.43	.55	.71	.43
Delayed[c] Experiment 4)	.61	.43	.17	.24	.48	.20

[a]Mean rating of units in each category. 7 = Absolutely essential to story.
1 = Totally unessential to story.
[b]Proportion of units in each category appearing in summaries.
[c]Proportion of units in each category appearing in recalls.

reliable, $p < .01$. The respective F (5,240) ratios of this main effect for the four experiments are 77.22, 59.04, 49.49, and 87.17. These analyses also indicated that story category interacted with sex, story version, and story topic. However, Dunn tests revealed that in 53 of the 60 individual comparisons within each level of the interacting factors, the combined mean judgment and recall scores of Internal Responses and Reactions was reliably lower than the combined mean judgment and recall scores of Settings, Initiating Events, Attempts, and Consequences ($p < .05$). In all 60 comparisons, the differences was in the predicted direction. This story category effect was also reliable, $p < .01$, when a comparable analysis was performed on the scores of individual content units summed across subjects. The respective F (5,188) ratios of the story category effect on these scores in the four experiments are 16.05, 12.06, 10.65, and 21.66.

Given that story category effects were replicated by these experiments, we now turn to evidence that they may be due, in part, to the Centrality of the content contained in the categories. The first evidence that Centrality affects the saliency of content within story categories involves the manipulation across story version of the Centrality of the three Internal Responses and the three Reactions of the middle episode of each story.

The results of these manipulations for each experiment are presented in Table 4. This table consists of nine scores for each set of Internal Responses and Reactions of each experiment. The rows of each set refer to the different types of stories while the columns

Table 4

Effects of Centrality on Judgments and Recall of Internal Responses and Reactions

	Internal Responses				Reactions		
Type of Story	Emotion	Cognition	Goal	Type of Story	Emotion	Cognition	Action
Rating[a] (Experiment 1)							
Central Emotion	**4.1**[b]	3.4	3.6	Central Emotion	5.3	3.8	3.5
Central Cognition	3.4	5.0	3.3	Central Cognition	2.4	5.4	3.0
Central Goal	3.6	3.4	4.9	Central Action	3.2	3.5	5.1
Summary[c] (Experiment 2)							
Central Emotion	**.39**	.31	.43	Central Emotion	**.39**	.37	.44
Central Cognition	.35	**.56**	.46	Central Cognition	.33	**.61**	.20
Central Goal	.31	.28	**.67**	Central Action	.39	.28	**.72**
Immediate Recall[d] (Experiment 3)							
Central Emotion	**.43**	.13	.50	Central Emotion	**.39**	.37	.44
Central Cognition	.37	**.46**	.65	Central Cognition	.33	**.61**	.20
Central Goal	.50	.15	**.60**	Central Action	.39	.28	**.72**
Long Term Recall[d] (Experiment 4)							
Central Emotion	**.09**	.02	.17	Central Emotion	**.20**	.11	.06
Central Cognition	.09	**.28**	.19	Central Cognition	.04	**.24**	.06
Central Goal	.19	.04	**.44**	Central Action	.19	.15	**.30**

[a]Mean rating importance rating. 7 = Absolutely essential to story, 1 = totally unessential to story

[b]Bold face units are classified as Central

[c]Proportion appearing in summaries.

[d]Proportion appearing in recall.

refer to the types of individual units. The scores for Internal Responses, for example, include three types of stories: Central emotion, Central cognition, and Central goal. This classification of stories corresponds to which Interanl Response of the middle episode of the story was classified as Central in that story version. The scores in these rows are the mean score of the three stories (i.e., Airplane, Bee, and Turtle story) that were of this type. The different types of Internal Responses identified by the columns correspond to identical units in each type of story. All that is varied across the three types of stories is the Centrality of these same three (per story) units. The data sets of the Reactions are similarly constructed.

Two types of comparisons can be made to test the hypothesis that Centrality enhances the judged importance and recall of units within these two story categories. First one can compare the score of Central Internal Responses or Reactions to the same type of Internal Response or Reaction that are classified as Non-Central. This compares a score across stories while holding the type of Internal Response or Reaction constant. In the data sets in Table 4, this involves comparing each score on the diagonal with the two scores in the same column. Second, one can compare the score of a Central Internal Response or Reaction to the Non-Central Internal Responses or Reactions contained in the same story. This compares a score across types of Internal Responses or Reactions while holding the story constant. In the data sets in Table 4, this involves comparing each score on the diagonal with the two scores in the same row.

Both types of the above comparisons confirmed the hypothesis that Centrality enhances the judged importance and recall of statements contained in these two story categories. Across the four experiments, a total of 48 planned comparisons were performed contrasting each diagonal score with the mean of the remaining scores in its column or row. Thirty-one of these compsarisons indicated that Central Internal Responses and Reactions are judged as more important, and recalled reliably better ($p < .05$), than Non-Central Internal Responses and Reactions of the same category or in the same story. In seven of these 48 comparisons, the difference was in the predicted direction, but statistically unreliable. This is somewhat expected as each score is based upon the rating or presence (absence) of a single unit in each story. This results in a large variance compared to scores based upon multiple units.

In ten of the comparisons, however, the difference was not in the predicted direction. These aberations included two patterns. First, the emotions contained in both Internal Responses and Reactions often were not significalantly enhanced by Centrality. This was true of the former type of emotion, in the summary, immediate and long-term recall experiments. And it was true in the latter type of emotion in the immediate recall experiment. Second, in the immediate recall experiment, the goals of the Central cognition stories were recalled better than Central goals, and Central cognitions.

The first pattern suggests that there is something intrinsic to emotions which renders them resistant to the effects of Centrality. This may be due to the fact that in naturally occurring stories,

emotions are very rarely Central. The second pattern is isolated and appears to be idiosyncratic to Internal Responses in the immediate recall experiment.

While the lack of effect of Centrality in these experiments suggests a limitation in the effects Cenrality, this limitation concerns emotions rather than story cateogry. Except for emotions, which are contained in both Internal Responses and Reactions, Centrality had reliable effects on the judged importance and recall of individual units contained in both Internal Responses and Reactions.

The second type of evidence that Centrality underlies, in part, story category effects, involves an an analysis of covariance performed on individual content units with story category entered as a between-unit factor and Centrality entered as a covariate. As a covariate, Centrality is highly reliable, $p < .01$. The respective F (1,191) ratios of this effect for the four experiments are 203.53, 281.23, 121.59, and 145.32. As can be seen in Table 5, Centrality accounts for nearly three-quarters of story category effects. This estimate is derived by comparing the sums of squares of the category effect before and after Centrality is entered as a covariate.

In spite of the fact that Centrality accounts for a large portion of story category effects, story category effects remain reliable after Centrality has been partialed out, $p < .01$. The respective F (5,191) ratios of this effect after Centrality has been partialed out are 6.29, 3.85, 3.33, and 8.76. Moreover, the pattern of category differences remains unchanged after partialling out Centrality. The adjusted means for each story category in the four experiments are

Table 5

Variance Accounted for (ω^2) by Story Category Effect[a] Before and After Centrality is Partialed Out

Type of Score	ω^2 before Centrality Partialed Out	ω^2 After Centrality Partialed Out	Proportion of Story[b] Category Effect Accounted for by Centrality
Judgment			
Rating	.27	.07	.73
Summary	.23	.04	.83
Recall			
Immediate	.19	.05	.74
Delayed	.32	.12	.63

[a]Computed from mean unit scores across subjects

[b] $1 - \frac{\omega^2 \text{ After}}{\omega^2 \text{ Before}}$

presented in Table 6. When these data are compared with the unadjusted means presented in Table 7, a similar pattern can be seen. In both data sets, Settings, Initiating Events, and Consequences are the most salient, followed by Attempts, followed by Internal Responses. The respective rank order correlations between the adjusted and unadjusted story category means in the four experiments are .87, .73, .94, and .99.

Thus, while to a large extent story category effects reflect the Centrality of the content they contain, they also reflect a genuine effect of story categories. This suggests that the story schema corresponding to these story categories is used during comprehension.

Discussion

These experiments support the processing assumptions of both story grammars and the present analysis. Three types of evidence support the processing assumptions of the present analysis. The first is that Central content was judged as more important and recalled better then Non-Central content. The second is that Central content decayed less over time than Non-Central content. The third is the enhancing effects of Centrality can occur within story categories, and in general account for a large portion of the story category effects. All of these results suggest that the data-driven processing assumed by the present analysis to make Central content more accessible during recall and more resistant to decay than Non-Central content.

On the other hand, two types of evidence support the processing assumptions of story grammars. The first is that the category effects reported by Stein (e.g., Stein & Glenn, 1979) and Mandler (e.g.,

Table 6
Judgement and Recall Scores for Each Story Category:
Mean Unit Scores After Centrality is Partialed Out

Type of Score	Setting	Initiating Event	Internal Response	Attempt	Consequence	Reaction
Judgment Rating[a] (Experiment 1)	4.7	5.4	4.4	5.1	5.3	4.6
Summary[b] (Experiment 2)	.59	.67	.54	.52	.67	.55
Recall Immediate[c] (Experiment 3)	.54	.61	.52	.50	.63	.45
Delayed[d] (Experiment 4)	.46	.39	.24	.24	.42	.22

[a] Mean rating of units in each category. 7 = Absolutely essential to story, 1 = totally unessential to story
[b] Proportion of units in each category appearing in summaries
[c] Proportion of units in each category appearing in recalls

Table 7
Judgement and Recall Scores for Each Story Category:
Mean Unit Scores Before Centrality is Partialed Out

Type of Score	Setting	Initiating Event	Internal Response	Attempt	Consequence	Reaction
Judgment						
Rating[a] (Experiment 1)	5.4	5.6	4.0	5.1	5.7	4.5
Summary[b] (Experiment 2)	.75	.74	.42	.53	.77	.51
Recall						
Immediate[c] (Experiment 3)	.66	.66	.42	.52	.71	.42
Delayed[c] (Experiment 4)	.55	.43	.17	.24	.48	.20

[a] Mean rating of units in each category. 7 = Absolutely essential to story, 1 = totally unessential to story
[b] Proportion of units in each category appearing in summaries
[c] Proportion of units in each category appearing in recalls

Mandler, 1978; Mandler & DeForest, 1979; Mandler & Johnson, 1977; Mandler, Scribner, Cole & DeForest, 1980) were replicated in all four experiments. The second is that this effect remained after Centrality was partialed out. Thus, while the manner in which story events are causally, purposefully, and componetially connected (i.e., Centrality) accounts for most of the variance in judgment and recall, there is still a reliable pattern across story categories that exists over and about this Centrality effect. The existence of this pattern over and above Centrality effects suggests that information indigenous to story categories is used during comprehension.

The conclusion that can be drawn from these two sets of results is that both data-driven processing utilizing knowledge of social actions and schema-driven processing utilizing knowledge of story structure occur during comprehension. Such a conclusion highlights the need for, and importance of, research involving the direct assessment of the child's knowledge of story structure (e.g., Stein, Note 3) and of social relations (e.g., Bisanz, in press; Bisanz & Voss, in press; Goldman, in press; Stein & Goldman, in press; Stein, Note 3) during reading. A better understanding of how these knowledge domains are used during comprehension is needed before we can begin to predict which of the several potential structures a reader will derive during reading.

Finally, there is a major caveat to these conclusions that must be borne in mind, namely that the data supporting the conclusion that knowledge of both social actions and story structure is utilized during comprehension is indirect. Judgments in the form of importance

ratings and summaries are only correlated, and not veridical, with initial comprehension processes. Similarly, recall assesses only the products of, and not necessarily the nature of, these processes. The conclusion that knowledge of both story structure and social actions are used during this processing rests heavily on the finding that Centrality accounts for much, but not all, of the variance underlying story category effects. However, Centrality as determined by relations is not the only dimension that has been shown to underlie story cateogry effects. Nezworski, Stein, and Trabasso (Note 4), have demonstrated that the semantic content also plays a decisive role in story category effects. Nezworski et al. found that the recall of critical semantic information did not vary when it was depicted across different versions as part the Setting, Initiating Event, Internal Response, Consequence, and Reaction categories.

Partialing out the Centrality of units does not remove the naturally occuring confound between story category and semantic content. Because of this, there remains the possibility that centrality judgments and recall primarily reflect the semantic content of events and states, and that the role of Centrality as determined by relations, and simple story category membership, is less critical to comprehension than our data seem to imply.

Unfortunately, this is likely to remain an intractable problem for some time. This is because there is currently no a priori way to identify which semantic content will be treated similarly during comprehension other than in terms of the causal, purposeful, and componential relations connecting it, the function it serves within a

story (i.e., story category membership) or intuition. Thus, the Centrality and story grammar categories remain as two meaningful and psychologically important ways to describe the content of stories.

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